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(54) **FIXING DEVICE AND AN ELECTRONIC DEVICE USING THE SAME**

(75) Inventor: **Chin-Lung Fan**, Taipei Hsien (TW)

(73) Assignee: **Wistron Corporation**, Taipei Hsien (TW)

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G06F 1/16 (2006.01)

(52) **U.S. Cl.**
USPC **361/679.58**; 361/679.02; 361/679.26; 361/679.27; 312/223.1; 312/223.2; 248/205.5; 248/206.2; 248/363

(58) **Field of Classification Search**
None
See application file for complete search history.

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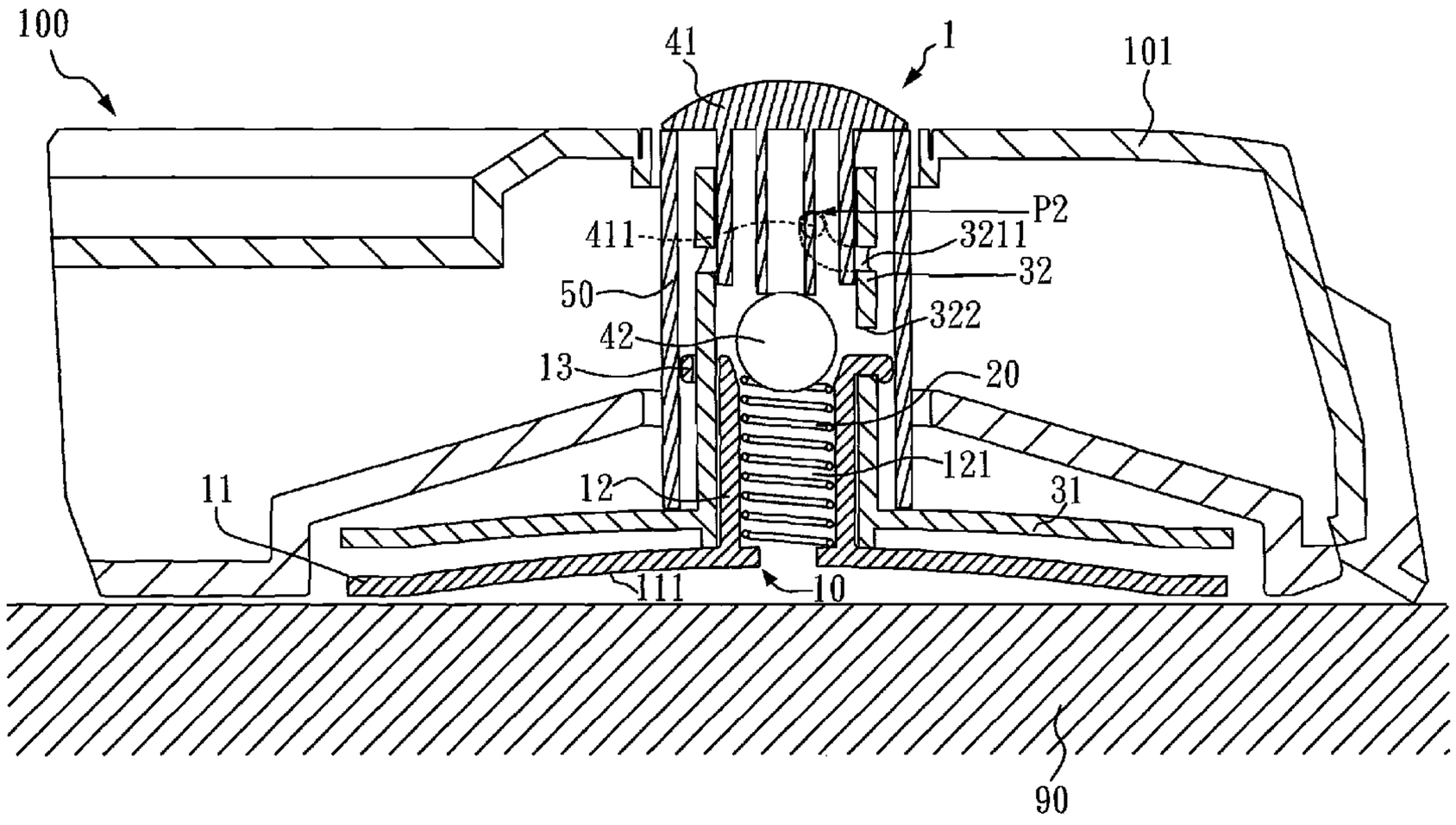
Primary Examiner — Anthony Q Edwards
(74) *Attorney, Agent, or Firm* — Muncy, Geissler, Olds & Lowe, P.C.

(57) **ABSTRACT**

A fixing device and an electronic device using the same are disclosed, wherein the fixing device is mounted in the electronic device's case for fixing the electronic device on a plane. The fixing device includes a suction cap, a cap cover, an elastic element, and a pressing element. The suction cap includes a suction section and a suction cap main body. The suction section has a suction surface and the body contains an accommodating area for accommodating the elastic element. The cover portion has a bottom part which is connected to a cover portion main body of the cap cover. The pressing element includes a pressing part and of which the shape matches the accommodating area. When the pressing element is pressed, the air flow within the accommodating area is blocked by the pressing part substantially.

20 Claims, 6 Drawing Sheets



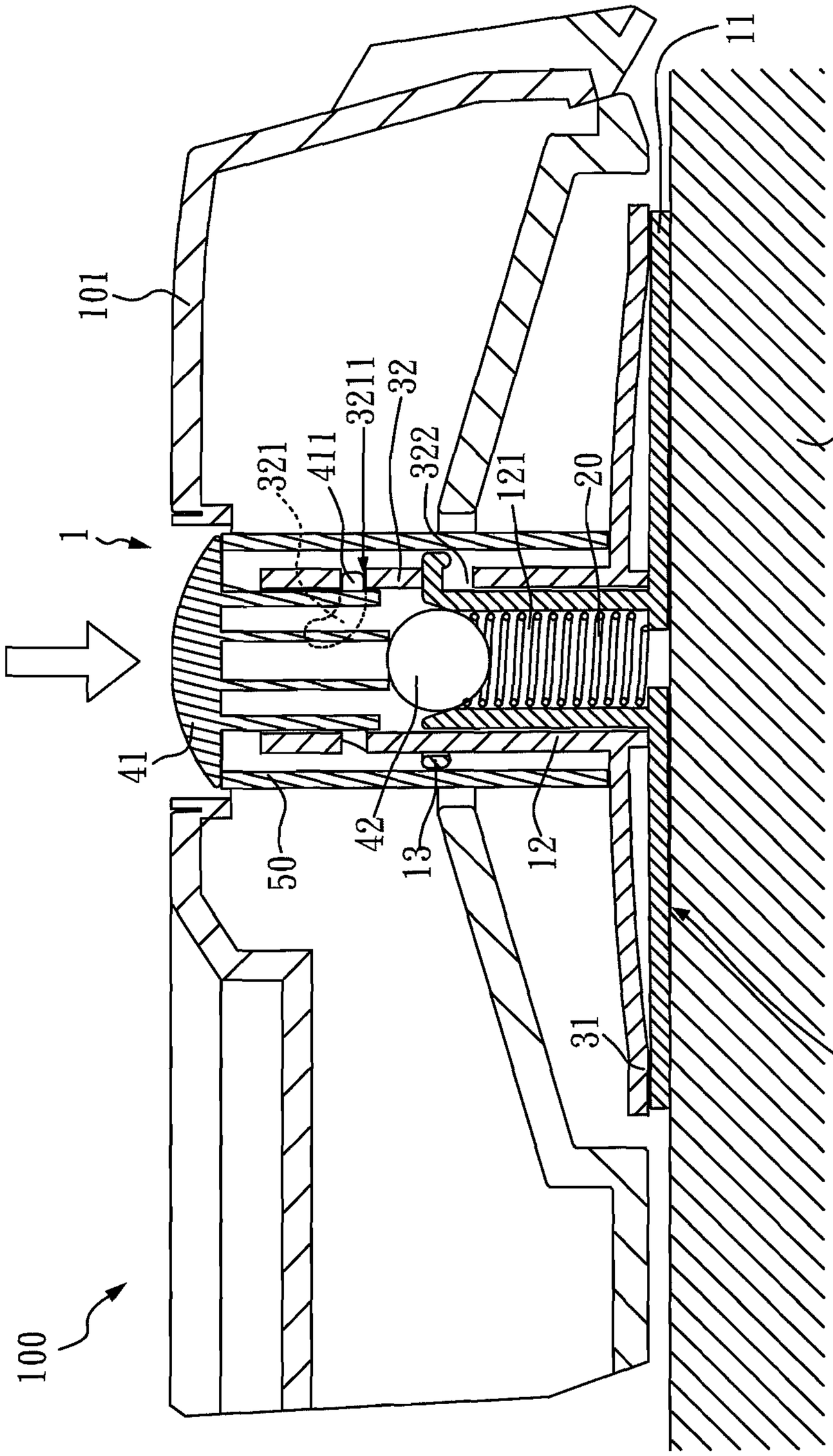


FIG. 1

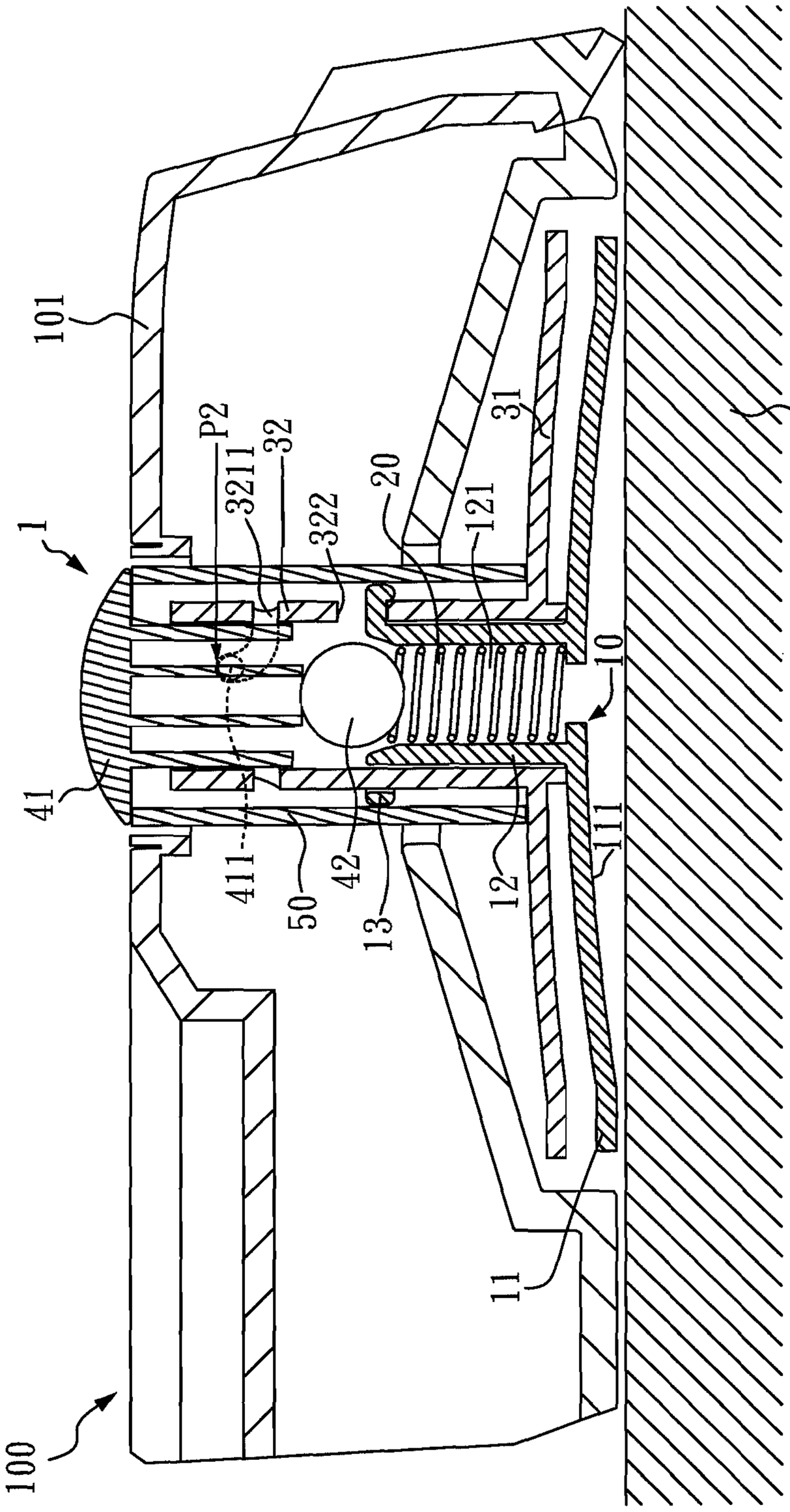


FIG. 2

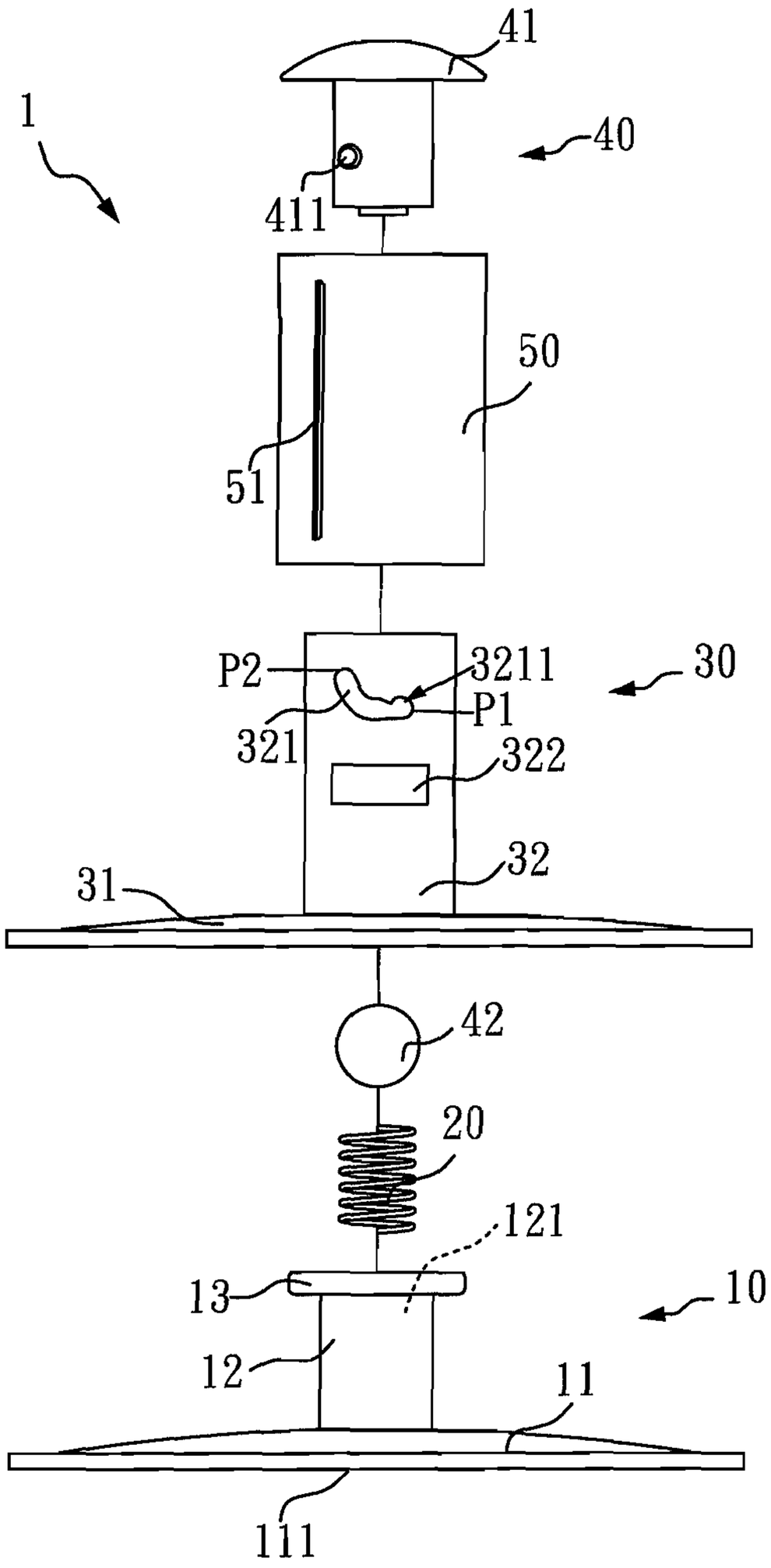

41
1
40
411
50
51
P2
3211
30
P1
321
322
32
31
42
20
121
13
10
12
11
111

FIG. 3

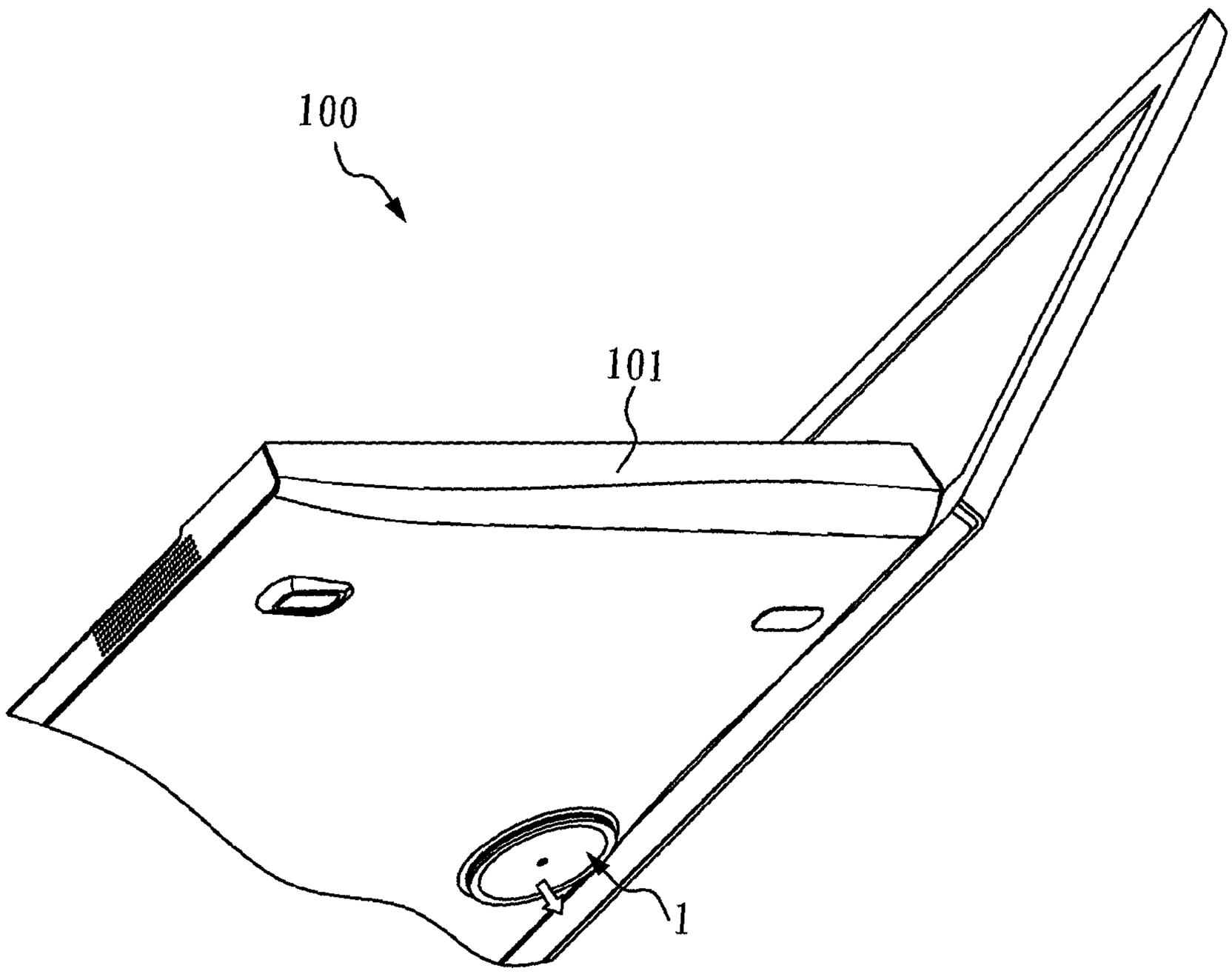


FIG. 4

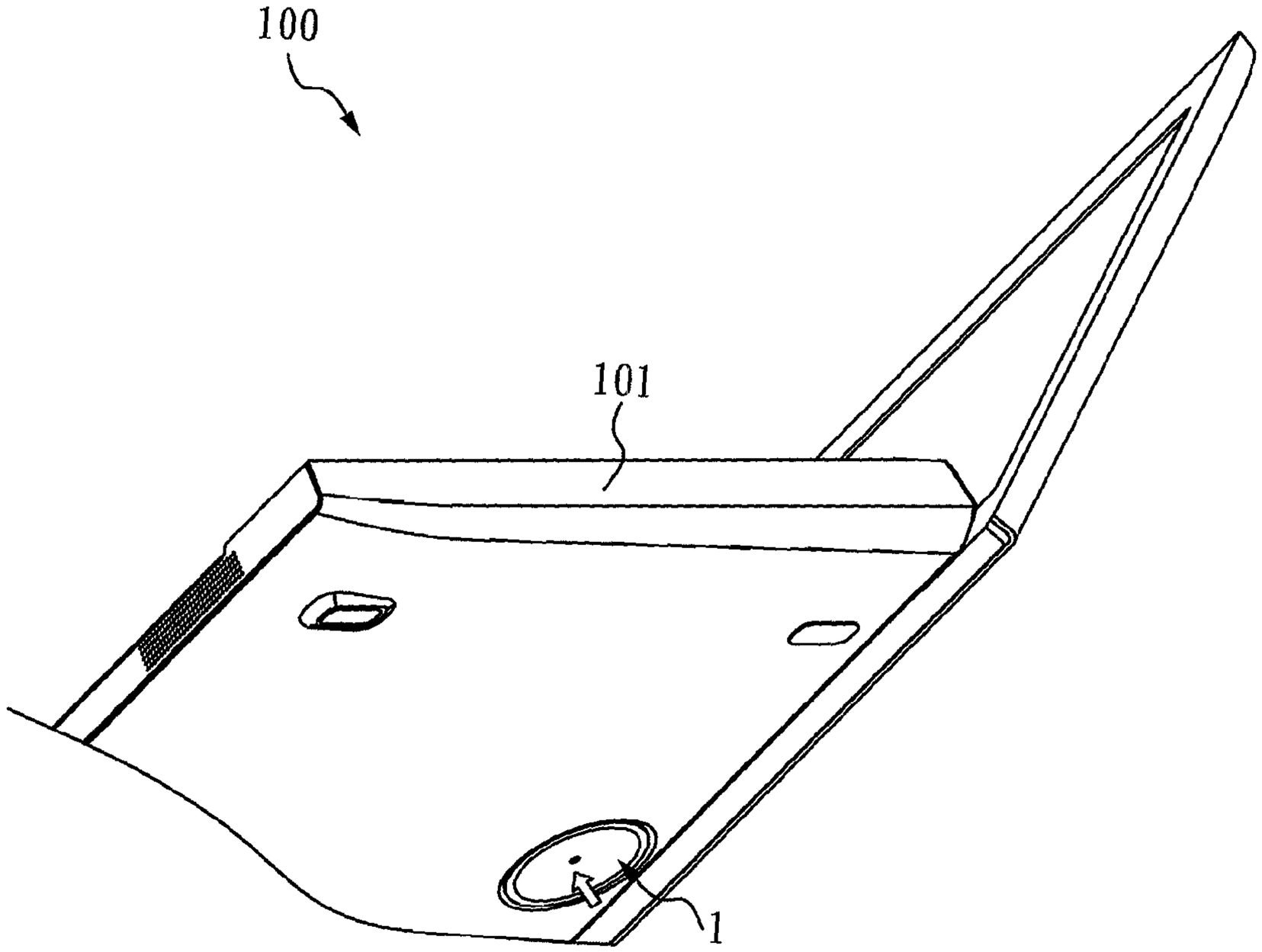


FIG. 5

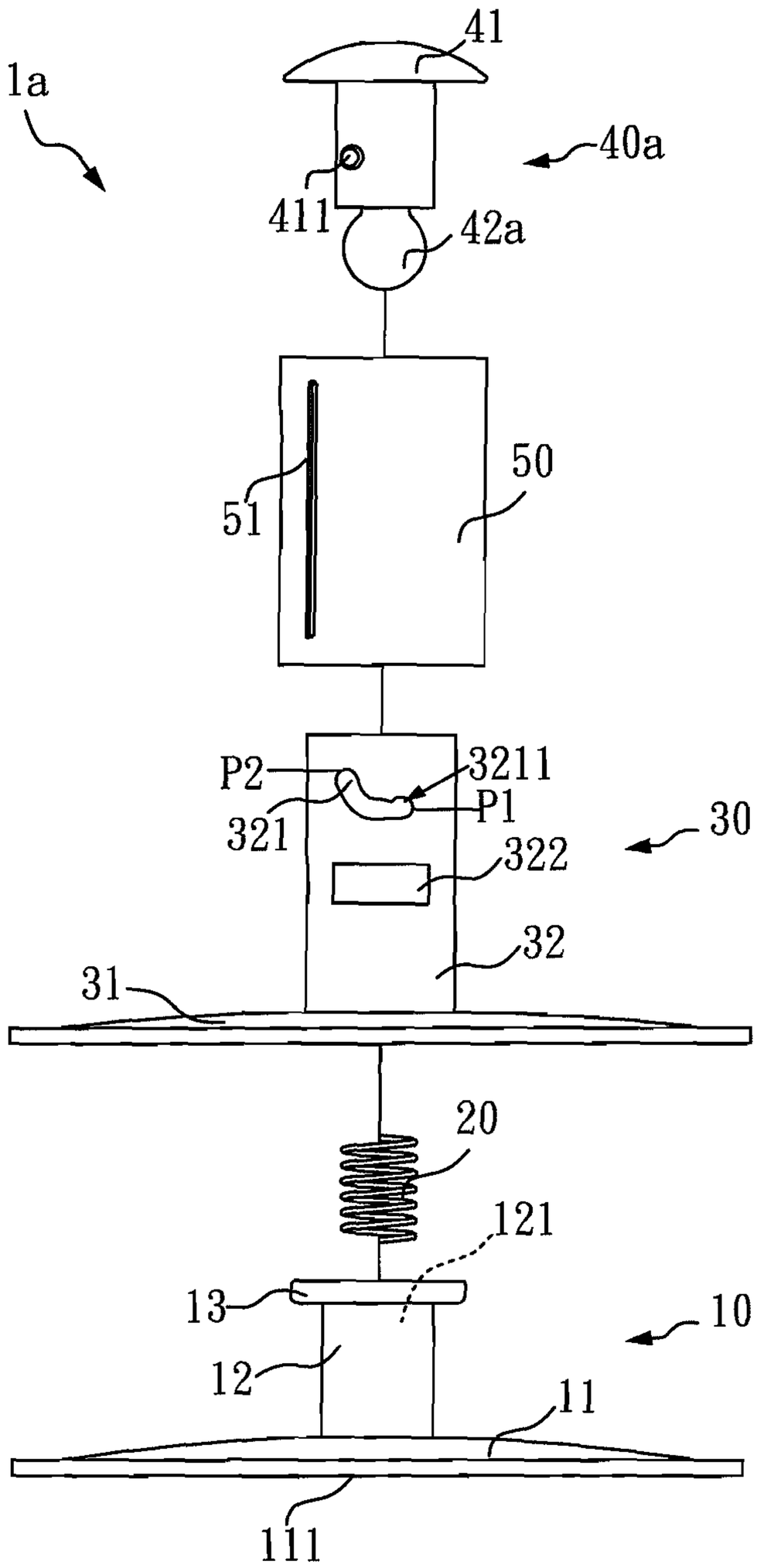

41
1a
40a
411
42a
50
51
P2
3211
P1
321
30
322
32
31
20
121
13
10
12
11
111

FIG. 6

FIXING DEVICE AND AN ELECTRONIC DEVICE USING THE SAME

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a fixing device and an electronic device using the same; more particularly, the present invention relates to a fixing device for fixing an electronic device on a plane.

2. Description of the Related Art

Due to size limitation, there is no built-in fixing device for a laptop computer. A user has to use an additional fixing device to fix the laptop computer, such that the laptop computer can be fixed on the plane. However, this is very inconvenient and user unfriendly.

A suction cap is a common fixing device. However, in most conventional suction cap usage modes, the suction cap is fixed to a tabletop by means of changing the contact area between a suction surface and the tabletop, or changing the pressure between the suction surface and the tabletop, such that the external atmospheric pressure is greater than the atmosphere pressure between the suction surface and the tabletop. However, for such usage modes, it is required to apply a force to the suction cap in order to change the pressure or contact area between the suction surface and the tabletop, therefore this kind of suction caps need a comparatively larger working space, which is more difficult to be applied to laptop computers.

Therefore, there is a need to provide a fixing device and an electronic device mounted with the same to mitigate and/or obviate the aforementioned problems.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a fixing device for fixing an electronic device on a plane.

It is another object of the present invention to provide an electronic device having a fixing device.

To achieve the abovementioned objects, the present invention discloses a fixing device and an electronic device using the same. The fixing device is mounted in a case of the electronic device, and is used for fixing the electronic device on a plane. The fixing device comprises: a suction cap, an elastic element, a cover portion and a pressing element. The suction cap includes: a suction section and a suction cap main body, wherein the suction section has a suction surface, the suction cap main body is combined with the suction section, and the suction cap main body comprises an accommodating area. The elastic element is accommodated in the accommodating area. The cover portion includes: a bottom part and a cover portion main body, wherein the bottom part is arranged on the suction section, the cover portion main body is combined with the bottom part, and is arranged on the suction cap main body. When the pressing element is pressed, the bottom part would push against the suction section, such that the suction surface is contacted with the plane so as to squeeze out the air between the suction surface and the plane. The pressing element comprises a pressing part and of which the shape matches the accommodating area. When the pressing element is pressed, the pressing part substantially blocks the air flow from entering the accommodating area.

In one embodiment of the present invention, the pressing element comprises a button and the pressing part, and the button and the pressing part is combined as a whole.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of the present invention will become apparent from the following description of the accompanying drawings, which disclose several embodiments of the present invention. It is to be understood that the drawings are to be used for purposes of illustration only, and not as a definition of the invention.

In the drawings, wherein similar reference numerals denote similar elements throughout the several views:

FIG. **1** illustrates a cross sectional schematic drawing of an electronic device and its fixing device when the fixing device is at a pressed position according to the present invention.

FIG. **2** illustrates a cross sectional schematic drawing of the electronic device and the fixing device when the fixing device is not at the pressed position according to the present invention.

FIG. **3** illustrates an exploded schematic view of the fixing device according to a second embodiment of the present invention.

FIG. **4** illustrates a schematic drawing of a bottom surface of the electronic device and the fixing device when the fixing device is at the pressed position according to the present invention.

FIG. **5** illustrates a schematic drawing of the bottom surface of the electronic device and the fixing device when the fixing device is not at the pressed position according to the present invention.

FIG. **6** illustrates an exploded schematic view of the fixing device according to a second embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Please refer to FIGS. **1** to **5**, which are related to an electronic device and its fixing device according to a first embodiment of the present invention. FIG. **1** illustrates a cross sectional schematic drawing of the electronic device and its fixing device when the fixing device is at a pressed position; FIG. **2** illustrates a cross sectional schematic drawing of the electronic device and the fixing device when the fixing device is not at the pressed position; FIG. **3** illustrates an exploded schematic view of the fixing device; FIG. **4** illustrates a schematic drawing of a bottom surface of the electronic device and the fixing device when the fixing device is at the pressed position; and FIG. **5** illustrates a schematic drawing of the bottom surface of the electronic device and the fixing device when the fixing device is not at the pressed position.

As shown in FIG. **1** and FIG. **2**, in one embodiment of the present invention, the fixing device **1** of the present invention passes through a case **101** of the electronic device **100**, and is mounted in the case **101**, so as to fix the electronic device **100** on a plane **90**. As shown in FIG. **3**, the fixing device **1** of the present invention comprises a suction cap **10**, an elastic element **20**, a cover portion **30**, a pressing element **40** and a sleeve element **50**. The suction cap **10** comprises a suction section **11**, a suction cap main body **12** and a top part **13**. The cover portion **30** comprises a bottom part **31** and a cover portion main body **32**. The pressing element **40** comprises a button **41** and a pressing part **42**. The sleeve element **50** comprises a notch **51**.

As shown in FIGS. **1** to **3**, the suction section **11** is approximately a disc-shaped object, and the suction section **11** has a suction surface **111**. The suction cap main body **12** is approximately a hollow cylindrical object, and comprises an accommodating area **121** as a non-limiting example. The top part **13** is approximately a flange. The suction cap main body **12** is located above the suction section **11**, and the top part **13** is located above the suction cap main body **12**. The suction section **11**, the suction cap main body **12** and the top part **13**

are combined as a whole, but please note the scope of the present invention is not limited to the above description. The accommodating area **121** is capable of accommodating the elastic element **20**. The elastic element **20** of the present invention is, but not limited to, a spring. As shown in FIG. **1**, when the elastic element **20** is pressed, the suction section **11** of the suction cap **10** would be pushed, such that the suction surface **111** would be contacted with the plane **90**.

As shown in FIGS. **1** to **3**, the cover portion **30** is arranged on the suction cap **10**. The bottom part **31** of the cover portion **30** is approximately a disc-shaped object, and the cover portion main body **32** is approximately a hollow cylindrical object. The cover portion main body **32** is located above the bottom part **31**, and is combined with the bottom part **31** as a whole, but please note the scope of the present invention is not limited to the above description. The cover portion main body **32** comprises a guide slot **321** and a connection slot **322**. The guide slot **321** is approximately a curve-shaped opening, and comprises a first end P**1**, a second end P**2** and a position limiting area **3211**, wherein the position limiting area **3211** is located close to one side of the first end P**1**. In this embodiment, the location of the first end P**1** is lower than the location of the second end P**2**. The connection slot **322** is approximately a rectangular opening, and is capable of accommodating the top part **13** of the suction cap **10**, so as to combine the cover portion **30** with the suction cap **10**.

The pressing element **40** comprises the button **41** and the pressing part **42**, wherein the button **41** is located above the pressing part **42**. The pressing part **42** is approximately a spherical ball as a non-limiting example. The button **41** comprises a guide pin **411**. The guide pin **411** is accommodated in the guide slot **321**, and is capable of moving within the guide slot **321**. When the button **41** is pressed and therefore moves downwards, the guide pin **411** would be driven to move between the first end P**1** and the second end P**2** of the guide slot **321**. When the guide pin **411** moves to the first end P**1**, the guide pin **411** would be held within the position limiting area **3211**, and at this time the suction cap **10** is contacted with the plane **90** (as shown in FIG. **1**). When the guide pin **411** leaves the position limiting area **3211** and moves to the second end P**2**, the suction cap **10** is departed from the plane **90** (as shown in FIG. **2**). Therefore, according to the cooperation between the guide slot **321** and the guide pin **411**, the moving process of the button **41** can be controlled.

When the button **41** is pressed and therefore moves downwards to make the guide pin **411** reach the first end P**1** of the guide slot **321**, the guide pin **411** would be held within the position limiting area **3211**, such that the button **41** would stop moving. At this time, the pressing part **42** would push against the elastic element **20**, such that the elastic element **20** would push against the suction section **11** of the suction cap **10**; meanwhile, the cover portion **30** would move downwards to push against the suction section **11** of the suction cap **10**. Therefore, the suction surface **111** would be contacted with the plane **90**, so as to squeeze out the air between the suction surface **111** and the plane **90**. At this time, as shown in FIG. **1**, part of the ball body of the pressing part **42** would substantially block the air flow from entering the accommodating area **121** of the suction cap main body **12**, so as to avoid adhesion degradation. As a result, the force for adhering the suction cap **10** to the plane **90** can be kept, such that the suction surface **111** can be stably fixed to the plane **90**. Please note that the pressing part **42** can be an element of any shape as long as it can block the accommodating area **121** to achieve the object of blocking the air flow from entering the suction cap **10**.

As shown in FIGS. **1** to **3**, the sleeve element **50** is approximately a hollow cylindrical object as a non-limiting example. The sleeve element **50** is arranged on the cover portion **30** and the suction cap **10**. The sleeve element **50** is combined with the case **101** via the notch **51**, such that the fixing device **1** can be stably combined with the case **101**. As shown in FIG. **1**, when the button **41** is pressed and therefore moves downwards, the button **41** would drive the sleeve element **50** to push against the cover portion **30**, such that the cover portion **30** would push against the suction section **11**, and therefore the suction surface **111** would be contacted with the plane **90**, so as to squeeze out the air between the suction surface **111** and the plane **90**.

When the fixing device **1** of the present invention needs departing from the plane **90**, the button **41** needs to be rotated so as to make the guide pin **411** leave the position limiting area **3211**. At this time, the button **41** moves upwards to the second end P**2** of the guide slot **321**, the pressing part **42** is departed from the cover portion main body **32**, and the elastic element **20** is recovered (as shown in FIG. **2**). At this time, the cover portion **30** is not contacted with the suction cap **10**, and the air flow would enter the suction cap **10** via the accommodating area **121**, so as to release the adhesion between the suction surface **111** and the plane **90**, such that the suction cap **10** can leave the plane **90**.

Further, as shown in FIG. **1** and FIG. **4**, when the fixing device **1** of the present invention is pressed, part of the suction cap **10** of the fixing device **1** would be protruded from the electronic device **100**. The height of the protrusion is approximately the same as or slightly higher than the height of the footpad generally installed in the bottom of the electronic device **100**. Therefore, the fixing device **1** of the present invention not only can fix the electronic device **100**, but also can replace the footpad generally installed in the bottom of the electronic device **100**. Moreover, as shown in FIG. **2** and FIG. **5**, when the fixing device **1** of the present invention is not pressed, part of the button **41** of the fixing device **1** would be protruded from the case **101** of the electronic device **100** for facilitating a user to press the button **41**. And the suction cap **10** and the cover portion **30** would be retracted in the electronic device **100**. Please note the scope of the present invention is not limited to the above description, the button **41** and the case **101** can be positioned at the same level as well.

Please refer to FIG. **6**, which is related to the electronic device and its fixing device according to a second embodiment of the present invention. FIG. **6** illustrates an exploded schematic view of the fixing device according to a second embodiment of the present invention.

The major difference between the fixing device **1***a* of the second embodiment and the fixing device **1** is: the button **41** and the pressing part **42***a* of the pressing element **40***a* the fixing device **1***a* of the present invention are combined as a whole, wherein the pressing part **42***a* is curve-shaped as a non-limiting example. The pressing part **42***a* is not limited to curve-shaped, the pressing part **42** can be an element of any shape as long as it can block the accommodating area **121** to achieve the object of blocking the air flow from entering the suction cap **10**. The operation process of the fixing device **1***a* is the same as the operation process of the fixing device **1**, therefore there is no need for further description.

Although the present invention has been explained in relation to its preferred embodiments, it is to be understood that many other possible modifications and variations can be made without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. A fixing device, mounted in a case of an electronic device, and used for fixing the electronic device on a plane, the fixing device comprising:

a suction cap, comprising:

a suction section, having a suction surface; and

a suction cap main body, combined with the suction section, wherein the suction cap main body comprises an accommodating area;

an elastic element, accommodated in the accommodating area;

a cover portion, comprising:

a bottom part, arranged on the suction section; and

a cover portion main body, combined with the bottom part, and arranged on the suction cap main body; and

a pressing element, wherein when the pressing element is pressed, the bottom part pushes against the suction section, such that the suction surface is contacted with the plane so as to squeeze out the air between the suction surface and the plane, wherein the pressing element comprises a pressing part of which the shape matches the accommodating area, and when the pressing element is pressed, the pressing part substantially blocks the air flow from entering the accommodating area, wherein the pressing element comprises a button, and when the button is not pressed, the suction cap and the cover portion is located within the electronic device.

2. The fixing device as claimed in claim **1**, wherein when the button is pressed, at least one part of the suction cap is protruded from the electronic device.

3. The fixing device as claimed in claim **2**, wherein the button and the pressing part are integrated into one body.

4. The fixing device as claimed in claim **1**, further comprising a sleeve element combined with the case, wherein the sleeve element is arranged on the cover portion and the suction cap, when the pressing element is pressed, the pressing element pushes against the sleeve element, such that the sleeve element pushes against the cap cover, and therefore the bottom part pushes against the suction section.

5. The fixing device as claimed in claim **4**, wherein when the button is pressed, at least one part of the suction cap is protruded from the electronic device.

6. The fixing device as claimed in claim **5**, wherein the button and the pressing part are integrated into one body.

7. The fixing device as claimed in claim **1**, wherein the suction cap comprises a top part, the top part is approximately a flange, the cover portion main body comprises a connection slot capable of accommodating the top part, so as to combine the cover portion with the suction cap.

8. The fixing device as claimed in claim **1**, wherein the cover portion main body comprises a guide slot, the pressing element comprises a guide pin, and the guide pin is accommodated in the guide slot for moving within the guide slot.

9. The fixing device as claimed in claim **8**, wherein the guide slot is curve-shaped and comprises a first end, a second end and a position limiting area, where the position limiting area is located close to one side of the first end; when the guide pin moves to the first end, the guide pin is held within the position limiting area, and the suction cap is contacted with the plane; when the guide pin leaves the position limiting area and moves to the second end, the suction cap is departed from the plane.

10. An electronic device, comprising:

a case; and

a fixing device, mounted in the case, and used for fixing the electronic device on a plane, the fixing device comprising:

a suction cap, comprising:

a suction section, having a suction surface; and

a suction cap main body, combined with the suction section, wherein the suction cap main body comprises an accommodating area;

an elastic element, accommodated in the accommodating area;

a cap cover, comprising:

a bottom part, arranged on the suction section; and

a cover portion main body, combined with the bottom part, and arranged on the suction cap main body; and

a pressing element, wherein when the pressing element is pressed, the bottom part pushes against the suction section, such that the suction surface is contacted with the plane so as to squeeze out the air between the suction surface and the plane, where the pressing element comprises a pressing part of which the shape matches the accommodating area, and when the pressing element is pressed, the pressing part substantially blocks the air flow from entering the accommodating area; wherein the pressing element comprises a button, and when the button is not pressed, the suction cap and the cover portion is located within the electronic device.

11. The electronic device as claimed in claim **10**, wherein when the button is pressed, at least one part of the suction cap is protruded from the electronic device.

12. The electronic device as claimed in claim **11**, wherein the button and the pressing part are integrated into one body.

13. The electronic device as claimed in claim **10**, further comprising a sleeve element combined with the case, wherein the sleeve element is arranged on the cover portion and the suction cap, when the pressing element is pressed, the pressing element pushes against the sleeve element, such that the sleeve element pushes against the cap cover, and therefore the bottom part pushes against the suction section.

14. The electronic device as claimed in claim **13**, wherein when the button is pressed, at least one part of the suction cap is protruded from the electronic device.

15. The electronic device as claimed in claim **14**, wherein the button and the pressing part are integrated into one body.

16. The electronic device as claimed in claim **10**, wherein the suction cap comprises a top part, the top part is approximately a flange, the cover portion main body comprises a connection slot capable of accommodating the top part, so as to combine the cover portion with the suction cap.

17. The electronic device as claimed in claim **10**, wherein the cover portion main body comprises a guide slot, the pressing element comprises a guide pin, and the guide pin is accommodated in the guide slot for moving within the guide slot.

18. The electronic device as claimed in claim **17**, wherein the guide slot is curve-shaped and comprises a first end, a second end and a position limiting area, where the position limiting area is located close to one side of the first end; when the guide pin moves to the first end, the guide pin is held within the position limiting area, and the suction cap is contacted with the plane; when the guide pin leaves the position limiting area and moves to the second end, the suction cap is departed from the plane.

19. A fixing device, mounted in a case of an electronic device, and used for fixing the electronic device on a plane, the fixing device comprising:

a suction cap, comprising:

a suction section, having a suction surface; and

a suction cap main body, combined with the suction section, wherein the suction cap main body comprises an accommodating area;

an elastic element, accommodated in the accommodating area;

a cover portion, comprising:

a bottom part, arranged on the suction section; and

a cover portion main body, combined with the bottom part, and arranged on the suction cap main body; the cover portion main body comprising a guide slot which is curve-shaped and comprises a first end, a second end and a position limiting area, where the position limiting area is located close to one side of the first end; and

a pressing element, wherein when the pressing element is pressed, the bottom part pushes against the suction section, such that the suction surface is contacted with the plane so as to squeeze out the air between the suction surface and the plane, wherein the pressing element comprises a pressing part of which the shape matches the accommodating area, and when the pressing element is pressed, the pressing part substantially blocks the air flow from entering the accommodating area; the pressing element comprises a guide pin, and the guide pin is accommodated in the guide slot for moving within the guide slot, wherein when the guide pin moves to the first end, the guide pin is held within the position limiting area, and the suction cap is contacted with the plane; when the guide pin leaves the position limiting area and moves to the second end, the suction cap is departed from the plane.

20. An electronic device, comprising:

a case; and

a fixing device, mounted in the case, and used for fixing the electronic device on a plane, the fixing device comprising:

a suction cap, comprising:

a suction section, having a suction surface; and

a suction cap main body, combined with the suction section, wherein the suction cap main body comprises an accommodating area;

an elastic element, accommodated in the accommodating area;

a cap cover, comprising:

a bottom part, arranged on the suction section; and

a cover portion main body, combined with the bottom part, and arranged on the suction cap main body; the cover portion main body comprising a guide slot which is curve-shaped and comprises a first end, a second end and a position limiting area, where the position limiting area is located close to one side of the first end; and

a pressing element, wherein when the pressing element is pressed, the bottom part pushes against the suction section, such that the suction surface is contacted with the plane so as to squeeze out the air between the suction surface and the plane, where the pressing element comprises a pressing part of which the shape matches the accommodating area, and when the pressing element is pressed, the pressing part substantially blocks the air flow from entering the accommodating area; wherein the pressing element comprises a guide pin, and the guide pin is accommodated in the guide slot for moving within the guide slot, wherein when the guide pin moves to the first end, the guide pin is held within the position limiting area, and the suction cap is contacted with the plane; when the guide pin leaves the position limiting area and moves to the second end, the suction cap is departed from the plane.

* * * * *